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THE GUNNELLICHTHID FISHES

with description of two New Species from East Africa and of

GUNNELLICHTHYS (CLARKICHTHYS) BILINEATUS (CLARK), 1936

By

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for Scientific and Industrial Research Fellow in Ichthyology.

Illustrations by Margaret M. Smith.

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THE GUNNELLICHTHID FISHES

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by J. L. B. SMITH,

Research Professor and South African Council
for Scientific and Industrial Research Fellow in Ichthyology,
Rhodes University, Grahamstown.

FAMILY GUNNELLICHTHIDAE.

(Microdesmidae. Paragobioididae)

A few specimens of a tiny fish taken by poison in tide pools in northern Mozambique in 1950 set in train a series of researches of world wide scope, which have resulted in the revelation of unsuspected relationships in fishes long a puzzle. The species concerned, because of its obvious relationship to **Paragobioides grandoculis** Kendall and Goldsborough, 1911 (from Marshall Islands, Pacific), was described as **Paragobioides copleyi** (Smith, Ann. & Mag.Nat.Hist., 1951, (12) IV, 518, figs. 1, 2).

Despite the small size of the specimens it was possible to determine a good deal of the cranial and related osteology, and while many of the characters indicated Gobioid affinities, the bones of the mouth were strongly suggestive of Ammodytid relationship, the large number of vertebrae (59) supporting this. The characters as a whole did not give clear cut direction to any one family, and in general suggested distinction for these fishes by family rank, (Paragobioididae) as was proposed at that time. Shortly after that paper had gone to press, vol. IX of the Fishes of the Indo-Australian Archipelago, by de Beaufort & Chapman, appeared, containing a description and figure (1951, p 448, fig. 86) of **Gunnellichthys pleurotaenia** Bleeker, 1858. From their data the overall similarity to **copleyi** was striking, although de Beaufort and Chapman showed **pleurotaenia** to have only 2 simple pelvic rays, the lower jaw scarcely prominent, the dorsal insertion somewhat more advanced than in my specimens, while the dorsal and anal were stated to be connected to the caudal. Being very fully occupied with a series of expeditions I was unable to go further into this matter at that time.

In 1955 (Pacific Science, April, 158) Gosline published a critical review of "Certain Gobioid fishes, with particular reference to **Kraemeria** and **Microdesmus**", drawing attention to the relationship between **Gunnellichthys** Bleeker, and **Microdesmus** Gunther, adducing evidence in favour of the view that these two genera were primarily Gobioid in nature. Gosline tentatively allocated the three genera, **Microdesmus** Gunther, 1864; **Gunnellichthys** Bleeker, 1858; and **Paragobioides** K & G, 1911 to the family Microdesmidae, together with the poorly known **Cerdale bilineata** Clark, 1936 (which he apparently had not seen) as a possible fourth genus. Gosline's excellent analysis, based on extensive detailed examination of the skeletons of diverse Gobioid fishes, stresses the broad Gobioid affinities of **Gunnellichthys** and **Microdesmus.** It may be noted that Kendall and Goldsborough (Mem.Mus.Comp.Zool. 1911, XXVI, No. 7, 324) had previously come to this conclusion for they placed their genus **Paragobioides** in the family Gobiidae.

Gunnellichthys Bleeker, had puzzled most systematists, who had not linked it with either **Paragobioides** or with **Microdesmus** Gunther, the latter genus having been generally accepted as Blennioid. Although a good deal of work was done on the Microdesmid fishes (genera **Microdesmus, Cerdale, Leptocerdale,** see below) nobody apparently connected **Gunnellichthys** or **Paragobioides** with that family. It is notable that Reid, (Proc.U.S.Nat.Mus. 1936, vol. 84, No. 3002, p. 55) in an excellent review of the Microdesmidae, expressed no views on the higher affinities of that family, dealing only with **Microdesmus** Gunther, nor did he mention **Gunnellichthys** or **Paragobioides.** Despite the clearly close relationship between these genera, it is only in recent times that this has been recognised.

A re-examination of Bleeker's types and cotypes has shown that the pelvics in **Gunnellichthys,** until now believed to consist of 2 simple rays, actually comprise a spine and 4 rays, and the retention of **Paragobioides** K & G, as distinct from the former is scarcely tenable.

Through the courtesy of the Director of the California Academy of Science, and of Dr. W. I. Follett, I have been able to examine the unique type of **Cerdale bilineata** Clark, from Indefatigable Island (Proc. Calif. Ac.Sci. 1936, XXI, No. 29, 394). This dark striped fish is closely related to **Gunnellichthys** Bleeker, but differs in having a greatly restricted gill opening, incisiform teeth, and only 3 pelvic rays, while the dorsal and anal are free from the caudal. If both **Gunnellichthys** and **Microdesmus** be maintained, full generic distinction for **bilineata** Clark is justifiable. However, while the species may well be divided into three groups, these merit no more than subgeneric distinction, and all forms are here regarded as falling within one genus, **Gunnellichthys** Bleeker, being the earliest. The family therefore becomes the Gunnellichthidae.

With new light on these fishes, during another expedition to the Pinda area of Mozambique in 1956, we specially hunted them and secured not only numerous specimens, and much larger, of **Paragobioides copleyi**, but also two further closely related species hitherto unknown. It is significant that **copleyi** was found alone in one restricted area, the other two occurred together in another, extending far along the shore. Ripe females of all three forms were taken.

There is little doubt that this East African material should fall in the family Gunnellichthidae, of which a revised diagnosis is as follows: Elongate to very elongate eel-like body, little compressed, mostly covered with minute, embedded, non-imbricating, circular cycloid scales, some on head. No lateral line. Nostrils small to rather large, tubular or with rim, the anterior at snout tip, the posterior high up before eye. Head fairly short. Mouth small, not protractile, usually oblique, maxilla to, near, or below eye, lips thick, with lateral flanges, not continuous across symphysis. Maxilla with anterior expansion overlapping premaxilla, almost meeting fellow at symphysis. Chin usually prominent, swollen, enters dorsal profile. Teeth small, recurved, caniniform, or incisiform, one or more series in each jaw, none on palate. Gill openings restricted, lateral, oblique, slit or porelike, before pectoral base. Dorsal continuous, along most of back, insertion rarely far behind pectoral, no spines, soft rays simple, posterior sometimes bifurcate. Anal similar, inserted near midway along body. Dorsal and anal joined to caudal or free. Pectorals short. Pelvics close together, of a feeble spine and 3-4 rays. Caudal short, of 15 principal rays. Vertebrae 42-62 (20-31+ 22-40). 5 branchiostegals. Hypurals with splint bone above and below.

Small rather aberrant Gobioid fishes of the tropics, found in shallow water, as far as is known living in sand or mud, usually not observed to be free swimming by day. Reproduction by demersal eggs. Only one genus, **Gunnellichthys** Bleeker, 1858 accepted here.

Genus **Gunnellichthys** Bleeker, 1858.

Bleeker, Act.Soc.Sc.Ind-Neerl. 1858, III, pp. 3,9.

Original spelling **Gunnellichthys,** later **Gunellichthys.** Generic synonyms are given under the respective subgenera. Genotype **Gunnellichthys pleurotaenia** Bleeker, 1858, East Indies. Diagnosis as for the family (above). About 20 species from tropical seas of all major oceans, here considered to fall into three sub-generic groups, as follows:

KEY TO SUB-GENERA.

A. Dorsal and anal joined to caudal. P 10-12. V I 3. ..... **Microdesmus**
B. Dorsal and anal free from caudal. V I 3-4.
  I. Gill opening surpasses pectoral base. P 13. V I 4, innermost ray shorter than penultimate. Teeth conical. Hind nostril small. ..... **Gunnellichthys**
  II. Gill opening restricted to below pectoral base. P 10. V I 3, inner ray longest. Teeth incisiform. Hind nostril large. ..... **Clarkichthys nov.**

The distribution of Microdesmid fishes is interesting, and is shown on the accompanying map. It is likely that more will be discovered on both sides of Africa.

Fig. 1. To show distribution of Gunnellichthid fishes. C: **Clarkichthys.** G: **Gunnellichthys.** M: **Microdesmus.**

Subgenus **Microdesmus** Gunther, 1864.

Microdesmus Gunther, Proc.Zool.Soc.Lond. 1864, 26. Type **M. dipus** Gunther (Panama).
Cerdale Jordan & Gilbert, Bull.U.S.Fish.Comm. 1881, I, 332. Type **C. ionthas** J & G (Panama).
Leptocerdale Weymouth, Proc.U.S.A.Nat.Mus. 1910, XXXVIII, 142. Type **L. longipinnis** Weymouth (Louisiana).

Diagnosis much as for **Gunnellichthys**, distinguished chiefly by union of vertical fins with caudal. 10 or 11 species, mainly from the coasts of tropical America, one from Bermuda, one endemic in West Africa. The species **longipinnis** Weymouth, 1910 from Louisiana also found in Senegal (Cadenat, 1950). None hitherto found in East Africa.

Subgenus **Gunnellichthys** Bleeker, 1858.

Paragobioides, Kendall & Goldsborough, Mem.Mus.Comp.Zool.Harv. 1911, XXVI, No. 7, 324. Genotype **P. grandoculis** K & G.

Genotype **G. pleurotaenia** Bleeker, 1858. A revised diagnosis is as follows: elongate eel-like body, covered with minute non-imbricate embedded cycloid scales, the head partly scaly, no lateral line. Nostrils tubular, the anterior at tip of snout, the posterior on side of snout before eye. 1-2 series of papillae each side of snout above, continuous along above eye. Gill openings lateral, not much surpassing pectoral base, gillrakers and pseudobranchiae obsolescent. Mouth oblique, lower jaw projects, chin prominent. Fine recurved sharp teeth in 1-2 series in each jaw, none on palate. Low dorsal fin along most of back, of numerous soft rays only, all simple or the posterior bifurcate. Anal similar, insertion about middle of body, rays simple or divided. Anal and dorsal free from caudal. Pectorals short, of 13-15 rays, the inner 9-11 divided. Pelvics short, thoracic, of a spine and 4 rays, 2-4 divided, the 3rd longest. Caudal of 15 principal rays, short, rounded or subtruncate, free. Vertebrae numerous, about 60, about 25 precaudal. Skull typically Gobioid, but with a forward expansion of the maxilla overlapping premaxilla and almost meeting in front. 5 Branchiostegals, the anterior remote from rest. Posterior part of ceratohyal slightly deeper. Pectoral radials 4, feebly hourglass shaped. Caudal with a splint bone above and below hypural lobes. Ovaries elongate, contain 1000-2000 fairly large, smooth demersal eggs.

Gunnellichthys pleurotaenia Bleeker, was stated originally, and by de Beaufort & Chapman (Fish.Ind. Aus.Archip. 1951, IX, 448) to have only 2 rays in the pelvic. This fin is so small that its structure is easily discernible only on staining. Earlier, (Smith, **loc. cit.** 1951) I reported 4-6 rays in the pelvic in **copleyi,** but now find the fin constantly I 4, the inner ray often simple. Inger (Field.Zool. 1957, XXXVI, No. 3, 401) reports 4 pelvic rays in a specimen of **pleurotaenia** Bleeker, from Borneo, and Dr. M. Boeseman has kindly examined Bleeker's type (87 mm.) and informs me that it has pelvic I 4.

Paragobioides grandoculis Kendall & Goldsborough, (Marshall Islands), differs from **pleurotaenia** and **copleyi** in lacking the dark stripes, and in dorsal origin well behind pectoral apex. The two new unbanded species described below are clearly congeneric with **copleyi**, and leave distinction for **Paragobioides** K & G, to rest only on the more posterior insertion of the dorsal, which is scarcely of generic rank. **Paragobioides** is therefore regarded as a synonym of **Gunnellichthys** Bleeker.

In the subgenus **Gunnellichthys** there are now 5 species, 2 from the central Pacific and 3 from East Africa, of which 2 now described as new. The East African fishes appear to remain hidden in the sand and never to emerge by day. As they were found in an area where wild beasts roam at night we did not search for them at that time.

KEY TO SPECIES OF SUBGENUS **GUNNELLICHTHYS** BLEEKER

A. A dark stripe from snout to caudal, dorsal with narrow stripe near margin. Anal origin midway between snout tip and caudal base or somewhat anterior.
   I. D 56-59. A 34-38. Dorsal and anal rays simple. No apparent stripe on head or along dorsal base (Pacific). ..... **pleurotaenia**
   II. D 60-63. A 38-40. Anal rays and posterior dorsal rays divided. A stripe on top of head continues along dorsal base (East Africa). ..... **copleyi**

B. No dark stripe from snout to caudal, dorsal fin plain. Dorsal and anal rays all simple.
   I. Dorsal originates well behind pectoral apex. Anal origin before median on body. D 58-60. A 37-38 (Pacific). ..... **grandoculis**
   II. Dorsal originates well in advance of pectoral apex. Anal origin behind median on body.
      a. A black spot on hind apex of opercle, a dark stripe at end of tail. Pelvics much shorter than pectorals, two outer rays simple, inner two bifurcate. Dorsal originates slightly before pectoral base. D 61. A 39-41 (East Africa). ..... **monostigma**
      b. No black marks on body or fins. Pelvics about as long as pectorals, all rays bifurcate. Dorsal originates over pectoral base. D 58-59. A 37-38 (East Africa). ..... **irideus**

Gunnellichthys (G.) pleurotaenia Bleeker, 1858.
(Fig. 2, C)

Gunellichthys pleurotaenia, de Beaufort & Chapman, Fish, Ind.Aus.Archip. 1951, IX, 448, fig. 86 (Bali. Celebes). Inger, Field Zool. 1957, XXXVI, No. 3, 401 (Borneo).

?**Taenioides gertrudae** Fowler, Ber.P.Bish.Mus. 1925, Bull. 22, 17 (Guam).

Dr. M. Boeseman has kindly confirmed that the pelvics are I 4 in Bleeker's two specimens, also in one from Bali. These have D 58-59, A 36-38, and chin prominent. **Taenioides gertrudae** Fowler, 1925 from Guam, (not noticed by Reid, 1936, **loc. cit.**), later recognised by Fowler as a Microdesmid fish, probably falls here. The specimen was of some age and likely shrunken and faded, but in most features, notably D 59, A 36, most dimensions and markings, agrees with **pleurotaenia.** The pelvics are shown as of 2 simple rays, as was the case with **pleurotaenia** Bleeker.

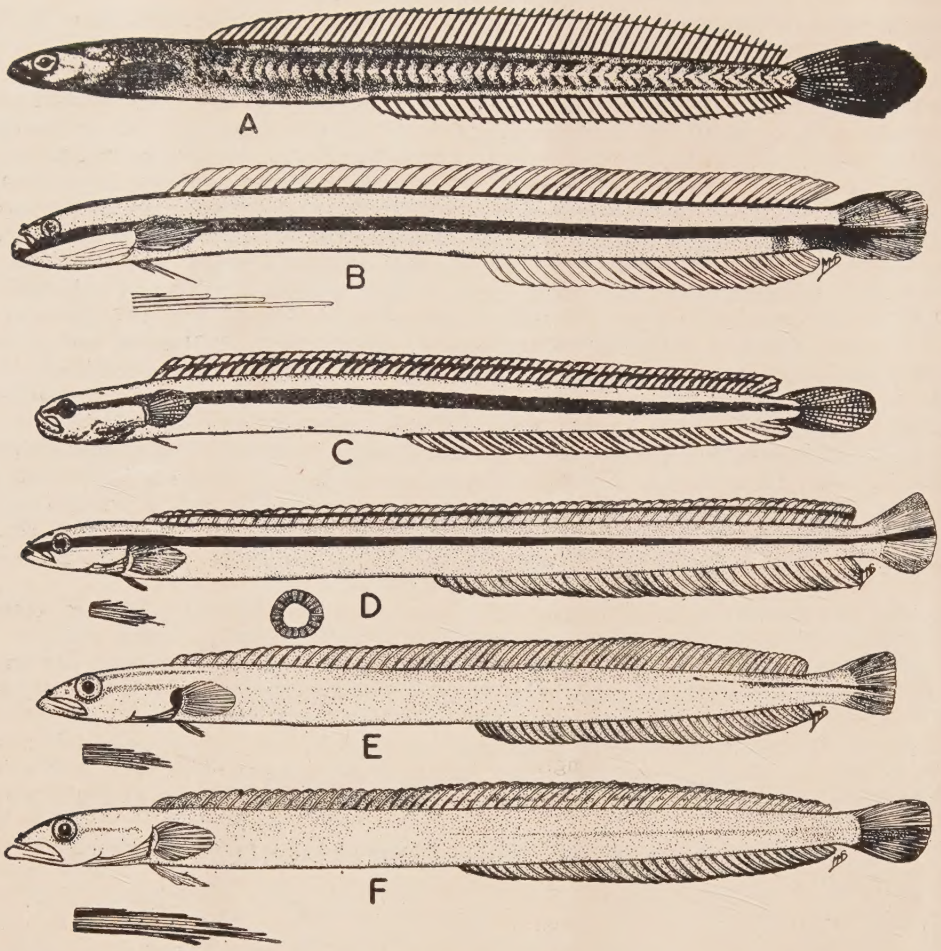

Fig. 2. Species of **Gunnellichthys** Bleeker. A. **(G.) grandoculis** (Kendall & Goldsborough). Type. After K & G. B. **(Clarkichthys) bilineatus** (Clark), Type, 41 mm. C. **(G.) pleurotaenia** Bleeker, Type (After de Beaufort & Chapman). D. **(G.) copleyi** (Smith), 110 mm. Below, scale, enlarged. E. **(G.) monostigma n. sp.** Type, 74 mm. F. **(G.) irideus n. sp.,** Type 77 mm. Pelvics where inset below enlarged 3 times.

Gunnellichthys (G.) copleyi (Smith), 1951.

(Fig. 2, D)

Paragobioides copleyi, Smith, Ann. Mag.Nat.Hist. 1951 (12), IV, 518, figs. 1, 2.

The above description was based on a few specimens 53-75 mm., from Pinda, Mozambique, also Kenya. As noted above we have since secured numbers of specimens of larger size in the type locality of Pinda, Mozambique. Little emendation of the original description is necessary, but a summary is given here: D 60-63. A 38-40. P 1-2, 10-11, 1 = total 13. V I 4. In 25 specimens A 39-40, only one has A 38. Eye 6-7 in head, 1.1-1.2 in interorbital, 1.4-1.5 in snout, about 4 in postorbital. Head 2.7-2.8 in trunk, 6.5-8.5 in body. Snout tip to: dorsal origin 14; to anal origin 48 percent of standard length. The dorsal origin is over front 4th of pectoral. Anal origin generally slightly before median, generally midway between snout tip and end of dorsal base. The first 20-25 dorsal rays simple, next few faintly bifurcate, remainder distinctly forked. All anal rays forked. Pectoral apparently constantly 13. Pelvics of a minute spine and constantly 4 rays, 3rd ray longest, in young 2 outer simple, inner 2 forked, with age 1st ray bifurcates apically, inner ray sometimes remains simple, sometimes all are forked. Pelvics less than half pectoral, which is about 2 in head.

Teeth sharply conical, in bands of 4-5 series in front of each jaw, outer series considerably enlarged and well separated.

A stained and cleared specimen larger than formerly available shows that (as suggested by Gosline **loc. cit.** 1955, p 164) in the caudal there is a small splint-like bone, both above and below main lobes of hypural bone, and the ceratohyal deepens at the articulation of the the 4th branchiostegal. Whereas smaller specimens were all virtually colourless, larger fishes are quite brilliantly coloured in life, (see below).

Colour, in life: adults: body mainly light yellow. From tip of snout median along nape to dorsal origin a 2/3 eye wide dark brown stripe that continues narrowly along each side of dorsal base to its hind end. A dark orange brown stripe, ½ eye width, from chin, through preorbital and eye, continuous above

pectoral, along upper part of body, curves down to middle on tail, narrows posteriorly, runs to end of caudal where it is bright orange; on head this band is bordered narrowly above and below by blue, and on tail by blue above. Chin, chest and belly pinkish. Basal half of dorsal yellow, bordered above by narrow orange brown line, above which the fin is narrowly blue, the margin orange, with thin black line. A narrow black line runs along distal third of whole dorsal. Caudal with central orange stripe, lobes mainly greyish at edges, yellow within. Anal plain yellow, with a continuous series of small brown blotches along base on body. Pectorals transparent. Pelvics yellow. Iris red and gold. Juveniles are almost colourless, but have the darker stripes described above. Adults, as preserved, greenish yellow, with dark stripes as described.

Numerous specimens, 28-115 mm. in length, juveniles white with brown black stripes, adults brightly coloured. Ripe females were found in September 1956, the ovaries occupy about 2/3 of abdominal cavity, estimated to contain about 1500 eggs each about 0.3 mm. in diameter, smooth, spherical, demersal, without filaments or projections.

Although very close to **pleurotaenia** Bleeker, I propose to regard **copleyi** as distinct, not only from the wide geographical separation, but in my numerous specimens the fin counts are constantly D 60-63; A 38-40, whereas **pleurotaenia** is stated to have D 56-59 : A 34-38, confirmed recently in a specimen from Borneo by Inger (Fieldiana: Zool, 1957, XXXVI, No. 3, 401) who states D 56; A 37; V 4.

Gunnellichthys (G.) grandoculis (Kendall & Goldsborough), 1911.

(Fig. 2, A)

Paragobioides grandoculis, Kendall and Goldsborough, Mem.Mus.Comp.Zool.Harv. 1911, XXVI, 324, Pl 6, fig. 2.

A single specimen, $1\frac{7}{8}$ inches long, Marshall Islands. Stated originally to have D 58, A 38, V I 5. Schultz, 1943 states D 60. A 37. V I 4. This is clearly congeneric with the East African material described below.

Gunnellichthys (G.) monostigma n. sp.

(Fig. 2, E)

D 60-61. A 39-41. P 2, 9-10, 3 = 14-15. V I, i, 2, i = V I 4. Vertebrae 25+33 = 58. Caudal with above 6 and below 7 procurrent spiniform rays, principal rays 2 above and 2 below simple, 11 branched, total 15.

Body elongate, eel-like, moderately compressed, more so posteriorly.

In percent of standard length : total length 108; depth 7.1-7.4; head 17.5-18; eye 3.3-3.5; snout 4.2-4.4; interorbital 2.1; postorbital 9.4-10.5; dorsal base 77; anal base 40; 3rd dorsal ray 3; 40th dorsal ray 4.5; 5th anal ray 3.2; 20th anal ray 4.6; pectoral 6.6-7.1; pelvic 3.5; depth peduncle 3.5. Snout tip to : dorsal origin 16; apex of pectoral 24-25; anal origin 53-57; end of dorsal base 95. Depth 13.5-14.5, head 5.7 in length. Head 2.1 in trunk. Eye 5-5.2 in head, 1.2-1.3 in snout, 2.8 in postorbital.

Branchiostegals 5, the anterior remote. Pectoral radials 4, elongate oval, slightly constricted medially. Both features almost exactly as observed in **copleyi.** Snout from above rather pointed. Interorbital convex, with median ridge. Gill membranes fused with isthmus, gill opening extends from upper margin of pectoral base to less than eye diameter before lower margin of pectoral base and slightly below its level. Hind margin of gill membranes undulate, with one point above, cover most of pectoral base.

Mouth fairly large, somewhat oblique, maxilla extends to below front or middle of pupil, lower jaw projects, chin prominent, globose. Lips not continuous across front of mouth, form a lateral fold. Fine recurved sharp teeth in 2 series in upper jaw, only one series visible in lower jaw, none on palate. Tongue free, rounded.

Dorsal origin slightly but distinctly in advance of pectoral base, rays anteriorly less than eye, gradually lengthen posteriorly to $1\frac{1}{2}$-2 times eye. Anal origin about midway between caudal base and eye, below about 25th dorsal ray, front rays remain subequal, but towards hinder third of fin increase slightly, thereafter decrease. All dorsal and anal rays simple, both fins free from body and caudal. Caudal subtruncate. Pectoral rounded, about 1.5 in postorbital, 2.4-2.5 in head, 2 upper and 3 lower rays simple. Pelvic about half length of pectoral, inserted beneath pectoral base, the spine very small, 1st and 4th ray simple, 2nd and 3rd bifurcate, 3rd longest. *(For scales see p. 129)*

Colour : In life, milky white with pastel shades, a conspicuous black spot, pupil size, on gill membrane before pectoral base. Head purplish above, green and orange below to eye level, a purplish stripe from below eye up and over opercle. Snout purple and green, lower jaw orange, lower part of cheek yellow, of operculum bluish. Body greenish above, flanks narrowly reddish, belly hyaline. Upper front part of tail narrowly green, a prominent red stripe about eye width from above anal origin to hind margin of caudal along upper part of side of tail, the hind part in males edged above dark brown to caudal base. Lower half of tail yellow green. Front half of dorsal orange above, green below, hinder half greenish below, yellow above. Caudal dusky above, a narrow zone above median red stripe yellow, below bluish. Anal basally blue, distal two-thirds red. Pectorals hyaline, pelvics light yellow. Iris green and yellow.

As preserved; uniform whitish with faint darker specks over most of body. A conspicuous dark pupil-size spot on hind margin of gill membrane before pectoral base; in males a narrow dark streak about head length along upper part of side of end of tail, extends on caudal.

Described from 5 specimens, 44-75 mm. total length, taken by poison in mid tide-pools with weedy sandy bottom, at Pinda, Mozambique. The type, 74 mm. in length, from Pinda, in this Department.

This is possibly a rarer form than **irideus,** or more resistant to poison, since only 5 specimens were found, always long after many of **irideus** had emerged from the sand. Ripe females were taken in September 1956. The paired ovaries occupy at least 2/3 of length of abdomen. The eggs are 0.2 mm. diameter, smooth, spherical, demersal, without filaments, a rough estimate is 2000 in one female 75 mm. length.

This species, while congeneric with the other two forms described, is clearly distinguished by markings and dimensions.

Gunnellichthys (G.) irideus n. sp.

(Fig. 2, F)

D 58-59. A 37-38. P 2, 9, 2 = 13. V I 4. Vertebrae 25+31 = 56. Caudal with above 7 and below 4 procurrent spiniform rays, principal rays 2 above and 1-2 below simple, 11-12 divided, total 15.

Body elongate, eel-like, moderately compressed, more so posteriorly.

In percent of standard length: total length 109-110; depth 6.4-6.8; head 16-17; eye 2.8-3; snout 4.2-4.4; interorbital 1.7-1.8; postorbital 8.7; dorsal base 76; anal base 44; 3rd dorsal ray 3.1; 40th dorsal ray 5.6; 5th anal ray 3; 20th anal ray 3.5; pectoral 6.9-7.2; pelvic 6.9-8.1; depth peduncle 3.3-3.7. Snout tip to: dorsal origin 16.5-17.1; apex of pectoral 23-24; anal origin 52; end of dorsal base 96. Depth 15-15.5, head 6-6.4 in length. Head 2.1-2.3 in trunk. Eye 5.4-6 in head, 1.5-1.6 in snout, 3.0-3.2 in postorbital.

Snout from above rather pointed, interorbital with median longitudinal ridge. Gill opening from upper margin of pectoral base to slightly below level of pectoral base, and an eye diameter before. Gill membrane covers most of pectoral base and has a fold below, hind margin crenulate, without distinct points.

Mouth slightly oblique, lower jaw projects strongly, chin prominent, globose, maxilla extends below pupil. Recurved conical teeth in 2-3 series in front of upper jaw, biserial on sides, none on palate, in lower jaw in 2 series. Lips not continuous across front of either jaw, flaplike on side. Tongue free, rounded.

Dorsal origin over pectoral base, anterior rays somewhat longer than eye, lengthen posteriorly, in front of anal they are almost twice width of eye, hind rays progressively shorter. Anal inserted about midway between caudal base and eye, below about 25th dorsal ray, mid rays longest, less than dorsal rays. End of dorsal and anal quite free from body and caudal. Caudal feebly convex. Pectorals rounded, about 2.5 in head, 1.3-1.4 in postorbital. Pelvics inserted below front of pectoral base, slightly shorter than to mostly somewhat longer than pectorals, of a small spine and 4 divided rays, the 3rd longest.

Minute embedded cycloid scales behind eye and over whole cheek and opercle. Interorbital apparently naked. The body covered with minute embedded cycloid scales, much as in **copleyi** (Fig. 2, D) nowhere imbricate or regular.

Colour: In life, milky white with pastel shades. Head purple above from snout. An irregular narrow purple stripe below eye runs up and back along opercle. Side of snout yellow, green behind eye between purple areas, yellowish below lower stripe, lower jaw reddish. Upper half of body greenish, darker posteriorly, flank and belly bluish, lower half of tail above anal light orange, extends onto caudal. Front half of dorsal reddish, hinder half bluish with a few reddish spots in front, plain behind, narrow margin reddish. Caudal with upper half greenish with a short red oblique bar in end of upper lobe, an orange stripe, narrowing posteriorly, from lower basal half, lower lobe hyaline, a red stripe at end. Anal yellow, margin narrowly orange. Pectorals pale greenish, pelvics bright orange. Iris blue. As preserved: uniform whitish, with fine faint specks over most of body, no conspicuous marks.

Described from 18 specimens, 70-85 mm. in length, taken in tide pools with weedy sandy bottom, at Pinda, Mozambique. The type 77 mm. in length from Pinda, in this Department. This species, while closely related to the other two from the same locality, is distinguished as shown in the key above.

In its own restricted area, this species proved to be as abundant as **copleyi** in another. Ripe females were found in September 1956. The ovaries occupy about ¾ of the length of the abdomen, and hold approximately 1000 eggs, which are 0.3 mm. in diameter, being spherical, smooth, demersal, without filaments or projections.

Subgenus **Clarkichthys nov.**

Genotype **Cerdale bilineata** Clark, 1936. With the characters of the family. Distinguished from subgenus **Microdesmus** Gunther, in dorsal and anal free from caudal, enlarged posterior nostril close above eye, and dark stripes along body. From **Gunnellichthys** Bleeker, distinguished by greatly restricted gill opening, fewer rays in all fins but the caudal, incisiform teeth, and much enlarged posterior nostrils close above eye. Named in honour of H. Walton Clark, who described the species.

Gunnellichthys (Clarkichthys) bilineatus (Clark), 1936.

(Fig. 2, B)

Cerdale bilineata Clark, Proc.Calif.Ac.Sci. 1936 XXI, No. 29, 394.

Known only from one specimen, 41 mm. in length, from Indefatigable Island (90°W x 1°S), redescribed below.

D 47. A 28. P 2, 7, 1 = 10. V I 3. Vertebrae 22+25 = 47. Caudal with 7 procurrent spiniform rays above and below, 15 principal rays, 2 above and 2 below simple.

Body elongate, moderately compressed, more posteriorly. In percent of standard length : total length 112; depth 8; head 14; eye 2.4; snout 2.2; postorbital 10; interorbital 2; dorsal base 80; anal base 40; 6th dorsal ray 2.7; 40th 5; pectoral 9; pelvic 8; peduncle depth 4.8. Chin tip to : dorsal origin 18.5; pectoral apex 24; anal origin 56; end of dorsal base 97. Depth 12.4, head 7.1 in length. Head 3 in trunk. Eye 6 in head, 4.2 in postorbital, 1.1 times snout.

Branchiostegals 5, the anterior remote. Snout from above rounded. Interorbital convex, with 2 skinny subparallel longitudinal ridges that reach front of snout, where they converge. Nostrils shortly tubiform, anterior at front of snout, posterior prominent, much larger, with low rim, above front of eye. Numerous fine papillae in series on head, several short vertical series below eye, several above pectoral base. Gill membranes united, gill aperture a small rounded opening before and below lower margin of pectoral base.

Mouth moderate, oblique, angle not to eye, lower jaw projects, chin prominent, globose, enters dorsal profile. Lips not continuous across symphysis, form lateral fold. Teeth distinctly compressed, incisiform, with rounded apices, apparently biserial in each jaw.

Dorsal origin over middle of pectoral, twice as far from anal origin as front of chin. Rays subequal, 1½-2 times eye, anterior 22 simple, articulations obscure, posterior rays feebly bifurcate apically. Anal origin postmedian, midway between caudal base and just before pectoral base, rays subequal to dorsal but smaller posteriorly, all but the first clearly articulate, the hinder feebly bifurcate apically. Pectoral lanceolate, midrays longest. Pelvics inserted below pectoral base, spine feeble, short, concealed, 1st ray shortest, 3rd, inner, longest, almost pectoral length, the rays appear to be all simple. Caudal rays apically broken, fin probably feebly convex.

Most of body covered with minute embedded non-imbricating circular cycloid scales, almost exactly like those on **copleyi** (Fig. 2, D), none visible on head.

Colour, preserved : Greyish, from front of snout a dark brown stripe along full width of interorbital, widens on nape and runs along both sides of dorsal base, along top of peduncle and base of upper caudal lobe, bending downwards to end of caudal. From front of chin, along cheek below eye, a brown stripe, narrower than eye, partly above pectoral base, under pectoral, along body, slightly submedian, runs along to end of caudal, here it is narrower covering 2 rays. Above end of anal a brownish blotch to lateral stripe. Fins light.

Described from the type, now found to be 41 mm. in length, 36 mm. standard length. The original description is remarkably accurate considering the small size of the specimen. I find the pelvic to be clearly I 3, and the pectoral of 10 rays, possibly another, minute above. As the specimen was not my own I could not stain it, hence am in some doubt about whether there are 10 or 11 pectoral rays.

In the original description (**loc. cit.** 1936, above) Clark stated that examples of this fish were seen among rocks in tidepools, active and flexuous and able to escape the net, and only the holotype was captured. There is a possibility that the statement is in error, for the original label with the type states "Tidepool..... Sod. cyanide". Most fishes of this type appear to remain concealed in mud or sand, at least by day.

ADDENDUM

Gunnellichthys monostigma n. sp.

Minute circular scales on body, sparse and separated anteriorly, increasingly close set towards tail, nowhere imbricate. None visible on head.